

Appln. No. 10/506,497
Amdt. dated May 24, 2006
Reply to Office Action of March 14, 2006

Amendments to the drawings:

The attached replacement drawing sheets include changes to figures 1-10. Figure 1 has been amended to include the legend -Prior art-, Figures 3, 7, 8, 9b and 10 have been amended to better show the outer edges of the components and all of the Figures have been amended to be in better form.

Attachment: Replacement Sheet

REMARKS

The Examiner's comments have been carefully reviewed.

With regard to paragraphs 2, 3 and 4 of the Office Action, amended sheets of drawings are enclosed wherein Fig. 1 is marked as PRIOR ART and Figs. 6, 7, 8, 9 and 10 have been amended to show the outer edges of the components. While it is true that the object shown in Fig. 8 is indeed flipped relative to Fig. 7, it is respectfully pointed out that there is nothing in Fig. 8 to suggest that the object depicted therein is intended to be the *whole* of the wafer shown in Fig. 7, as apparently understood by the Examiner. Indeed, the Examiner's attention is respectfully drawn to the description of Fig. 8 on page 4, which states:

Fig. 8 shows pictorially a single sensor element according to the invention cut from the wafer shown in Fig. 7.

It emerges clearly from this description that the object shown in Fig. 8 is cut from the wafer shown in Fig. 7 and is thus only a component thereof.

With regard to paragraph 5 of the Office Action, the title has been amended. It is respectfully submitted that the new title clearly reflects the claimed invention.

The objection presented in paragraph 6 of the action is respectively traversed for the reason that claims 24, 30 and 52 are clearly in proper form. The fact that the independent and dependent claims are in different statutory classes does not, in itself, render the letter improper. MPEP 608.01(n), part III. In addition, submitted herewith is a page from Chisum on Patents, discussing Board decisions on this issue. However, each of claims 24 and 52 has been amended to refer to "the method of" the claim from which it depends, in order to obviate any possible formal objection. Accordingly, in the absence of citation of some supporting authority, it is requested that this objection be withdrawn.

With regard to the rejection presented in Section 8 of the Action, the rejected dependent claims have been amended to clarify the component to which the un-exposed surface belongs. Accordingly, it is requested that this rejection be reconsidered and withdrawn.

In paragraphs 9 and 10, the Examiner has rejected claims 1-5, 20-27, 29-34 and 48-52 under 35 USC §102(e) as being anticipated by US Patent No. 6,510,195 (Chappo et al.). In paragraphs 11 and 12 he rejects the remaining claims under 35 USC §103(a) as being obvious - also in view of Chappo et al. These rejections are respectfully traversed for the following reasons.

Chappo et al. relates to a detector having a scintillating layer 50, which overlays a light-receiving surface of a back-illuminated photodiode (BIP). The scintillating layer 50, which may be deposited on the BIP array [col. 5, line 55], emits light when bombarded by X-rays and the resulting photons strikes the detector. The BIP is bump-bonded to the wafer as is clearly seen in Figs. 2A and 3 and described at col. 6, lines 47-48.

Several important distinctions are to be noted between claims 1 and 2 of the present application and Chappo et al. First, the light receiving surface of the BIP in Chappo et al. is the equivalent of the sensor layer as claimed in claims 1 and 2 and not the scintillator layer. Secondly, the light-receiving surface of Chappo et al. is certainly not integrated on the readout electronics. Thus, as is also clearly seen in Figs. 2A and 3 and described at col. 7 of Chappo et al., the readout electronics are formed on a carrier substrate 58, which can be a PCB [col. 7, line 23] that has contacts 57 on its back side [Fig. 6 and col. 7, lines 33-34]. Each photodiode, corresponding to the sensor elements as claimed in claims 1 and 2, has a contact on the backside of the BIP [col. 7, line 39], which is routed through the carrier substrate to corresponding elements of the readout electronics by means of vias 70 as described at col. 7, line 47.

Claims 1 and 2 recite that the readout electronics are integrated on a wafer so as to form an integrated circuit having at least one array of electronic processing circuits with sensor inputs and terminal nodes being accessible from a first surface of the wafer. The sensor material is deposited on a second opposite surface of the wafer so that an unexposed surface of the wafer forms multiple electrodes each in registration with a corresponding electrically conductive via that extends from the respective sensor input to the second surface of the wafer. In contrast, in Chappo et al. the electronic processing circuits are not integrated on a wafer but are formed on a carrier substrate 58 that is not part of the BIP array 52.

So it is respectfully submitted that it is not correct to construe Chappo et al. as disclosing the feature of integrating the electronic processing circuits on a wafer so as to form an integrated circuit. The Examiner is correct in that in claims 1 and 2 the formation of vias serves to electrically couple the readout electronics to the photodiode array and that a similar technique is used by Chappo et al. But the Examiner is wrong to suggest that the sensor material is deposited on the photodiode array. Indeed it does not make sense to suggest that sensor material is deposited on the photodiode array since the sensor material as recited in

claims 1 and 2 is part of the photodiode array and is deposited not on the photodiode array but rather on the wafer that contains the integrated readout electronics.

It does appear to be correct that the scintillation layer can be deposited on the PIB as stated by the Examiner; but even in this case the PIB is attached to the carrier substrate using bump bonding. It is thus clear that even if the scintillation layer were to be construed as the sensor layer as recited in claims 1 and 2, Chappo et al. still do not teach that the scintillation layer is deposited on the wafer.

On this basis, it is respectfully submitted that Chappo et al. cannot anticipate the claims of the present application.

This notwithstanding, the independent claims have been amended so as to include the features originally claimed in claims 17 and 18, namely that depositing the sensor elements includes growing amorphous or polycrystalline sensor material on the second surface of the wafer so as to form an array of sensor elements, each having an electrode having a first polarity which is in ohmic contact with a respective one of the conductive vias and such that the exposed surface of the sensor material forms a common electrode having a polarity that is opposite to the first polarity.

The Examiner acknowledges that this feature is not disclosed by Chappo *et al.* but nevertheless has rejected claims 17 and 18 on the grounds that "such would have been obvious to one of ordinary skill in the art in order to obtain the absorptive capabilities to capture high-energy photons." This reasoning seems strange since this is not the reason why the sensor material is deposited, let alone grown, on the wafer. Rather the manner in which the sensor material is deposited on the wafer avoids the need to align the sensor material with the sensor inputs, since the very act of depositing the sensor material on the wafer, creates a respective anode wherever the unexposed surface of the sensor material mates with the sensor input. This is clearly not the case in Chappo *et al.* where the readout electronics mounted on the carrier substrate 58 must be mounted in registration with the PIB, which as noted above is the sensor against which photons (emitted by the scintillation layer) strike. It is thus clear that the method according to the invention as defined by claims 1 and 2 results in a much simplified approach to fabricating the sensor corresponding to the PIB and associated readout electronics than may be achieved by Chappo *et al.*

Moreover, the explanation of the rejection of claims 17 and 18 is not based on any supporting evidence of prior art knowledge of the benefit asserted in support of the rejection,

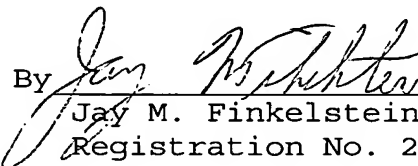
or on any reasoning derived from prior art knowledge. For this reason alone, the rejection of claims 17 and 18 is not well founded.

No separate analysis of the dependent claims is provided since it is believed that they are allowable in view of their dependencies on allowable base claims.

In conclusion, in view of the amendments to the claims and the above comments, it is respectfully submitted that the claims are patentable over the prior art of record. Favorable reconsideration is requested.

Respectfully submitted,

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Footnote 3. U.S. Patent & Trademark Office, *Manual of Patent Examining Procedure* § 608.01(n) (7th 1998) ("The fact that the independent and dependent claims are in different statutory classes does not, in itself, render the latter improper. Thus, if claim 1 recites a specific product, a claim for the method of making the product of claim 1 in a particular manner would be a proper dependent claim since it could not be infringed without infringing claim 1. Similarly, if claim 1 recites a method of making a product, a claim for a product made by the method of claim 1 could be a proper dependent claim. On the other hand, if claim 1 recites a method of making a specified product, a claim to the product set forth in claim 1 would not be a proper dependent claim if the product might be made in other ways.").

See also *Ex parte Porter*, 25 USPQ2d 1144, 1147 (Bd. Pat. App. & Int'f 1992) (a method claim may depend upon an apparatus claim; claim 7 provided: "A nozzle suitable for use in discharging a controlled stream of fluid into a reactor tube of a catalyst unloading apparatus for removing non-packed, non-bridging, and packed bridging flowable catalyst and bead material from within the reactor tube, said nozzle comprising ..."; claim 6 provided: "*A method* for unloading non-packed, non-bridging and packed, bridging flowable particle catalyst and bead material from the opened end of a reactor tube *which comprises utilizing the nozzle of claim 7.*" (emphasis added); "The manner in which claim 6 has been drafted has been an acceptable format for years. The format of claim 6 apparently is used more often in chemically related applications ... Contrary to the examiner's assertion that claim 6 has no method step, the claim clearly recites the step of 'utilizing.' ... While claim 6 could be construed as an independent claim, drafted in a short-hand format to avoid rewriting the particulars of the nozzle recited in claim 7, for fee calculation purposes the Office initially treats all claims that refer to another claim as a dependent claim ... [W]e ... regard a claim that incorporates by reference *all* of the subject matter of another claim, that is, the claim is not broader in any respect, to be in compliance with the fourth paragraph of 35 USC § 112. From the above discussion, it follows that we will not sustain the rejection of claim 6 under either the second or fourth paragraph of 35 USC § 112"); *Ex parte Moelands*, 3 USPQ2d 1474, 1475 (PTO Bd. App. & Int'f 1987) (one claim recited "In a station for data transmission, the improvement comprising ... " another claim recited "A data transmission system comprising: at least two of the data transmission stations of claim 10; a clock bus interconnecting the clock terminals of the stations. ... ;" "the language relating to plural data transmission stations ... constitute[s] 'a further limitation of the subject matter claimed' within 35 U.S.C. 112 , fourth paragraph. This language ... encompasses the situation presented here, where a dependent claim makes plural what is already set forth in that dependent claim's parent claim or claims.").